



Combination FIRE SMOKE DAMPERS

Model FSD-M211

Steel 3V Blades

UL 555S Leakage Class I

UL 555 1 1/2 Hour Fire Resistance Rating

4 Hour Fire Resistance Rating (BS476)

Application

Model FSD-M211 is a combination fire smoke damper with 3V style blades. The FSD-M211 has been qualified to 10.2 m/s and 1 kPa for operation and dynamic closure in emergency fire smoke situations. Model FSD-M211 may be installed vertically (with blades running horizontal) or horizontally and is rated for airflow and leakage in either direction.

Model FSD-M211 has also been tested in accordance with BS476 to 4 hours at Warrington Fire, UK, and is approved for fire partitions of 4 hours or less where British Standards are required.

Ratings

UL 555 Fire Resistance Rating

Fire Rating:	1 1/2 Hours
Dynamic Closure Rating:	Actual ratings are size dependant
Maximum Velocity:	10.2 m/s
Maximum Pressure:	1 kPa

UL 555S Leakage Rating

Leakage Class:	I
Operational Rating:	Actual ratings are actuator dependant
Maximum Velocity:	10.2 m/s
Maximum Pressure:	1 kPa
Max. Temperature:	177°C – Depending on actuator

BS476 Fire Resistance Rating

Fire Rating:	4 hours
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Standard Construction

Frame:	127mm x 25mm galv. steel hat channel with reinforced corners . A low profile head and sill are used on sizes less than 432mm high to maximize free area and performance.
Blades:	1.5mm galvanized steel, reinforced with 3 longitudinal structurally designed vee's.
Seals:	Extruded silicone rubber blade seals. Flexible stainless steel jamb seals.
Closure Device:	74°C RRL
Linkage:	Concealed in jamb.
Axles:	13mm diameter plated steel
Bearings:	Bronze sleeve type.

Size Limitations

Minimum Size:	101mm W x 101mm H
Maximum Size:	
Single Section:	813mm W x 1270mm H or 914mm W x 914mm H
Multiple Section:	3251mm W x 2540mm H Vertical or 3658mm W x 2438mm H Horizontal

Optional Features

- Stainless steel bearings
- 100°C, and 177°C RRL available (UL only)
- 69°C fusible link (BS476)
- Electric or pneumatic actuators to accomplish smoke management and system functions.
- Sleeve with Integral flange on both sides available
- RRL/OCI (open close indication)
- TOR (remote override of 74°C or 100°C closure allows damper to perform smoke management functions during a fire emergency)

Model FSD-M211 meets the requirements for fire dampers, smoke dampers and combination fire smoke dampers established by:

National Fire Protection Association

NFPA Standards 80, 90A, 92A, 92B, 101, & 105

IBC International Building Codes

ICBO Uniform Building Codes

SBCCI Standard Building Codes

British Standard BS476

Tested to 4 hours at Warrington Fire, UK

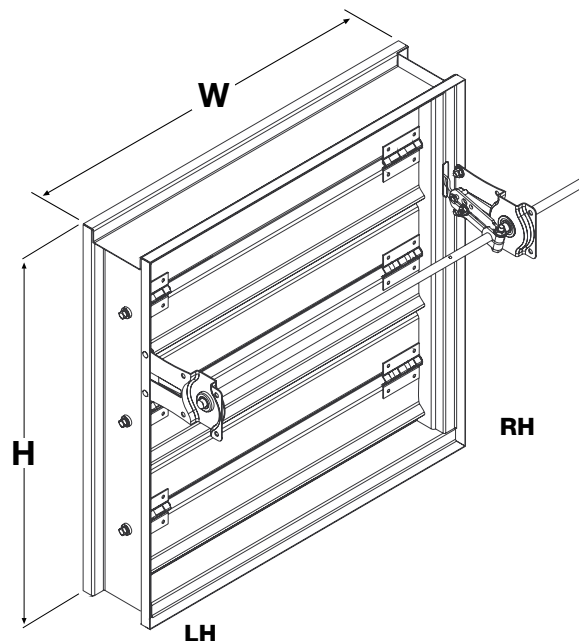
“UL CLASSIFIED (see complete marking on product)”

“UL CLASSIFIED to Canadian safety standards (see complete marking on product)”

Standard 555 & 555S (Listing #R13317)



Greenheck Kunshan Co. Ltd. and Greenheck Fan Corporation certifies that the model FSD-M211 shown herein is licensed to bear the AMCA Seal. The ratings shown are based on tests and procedures performed in accordance with AMCA Publication 511 and comply with the requirements of the AMCA Certified Ratings Programs. The AMCA Certified Ratings Seal applies to air performance ratings only.



*W & H dimensions furnished approximately 6mm undersize. (Add sleeve thickness for overall sleeved damper dimension)
Right hand drive is shown. Left hand drive is available upon request.

Installation instructions available at www.greenheck.com

This pressure drop testing was conducted in accordance with AMCA Standard 500-D using the three configurations shown. All data has been corrected to represent standard air at a density of 1.201 kg/m³.

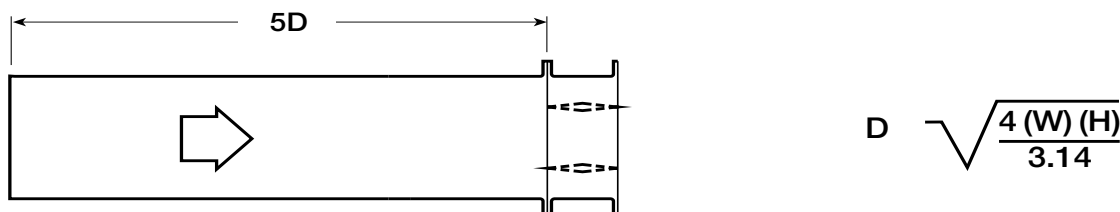
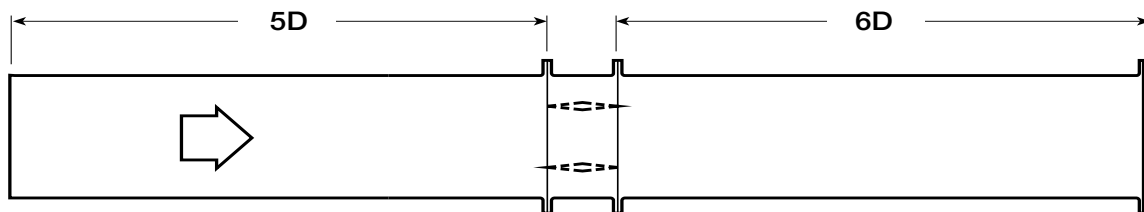
Actual pressure drop found in any HVAC system is a combination of many factors. This pressure drop information along with an analysis of other system influences should be used to estimate actual pressure losses for a damper installed in a given HVAC system.

AMCA Test Figures

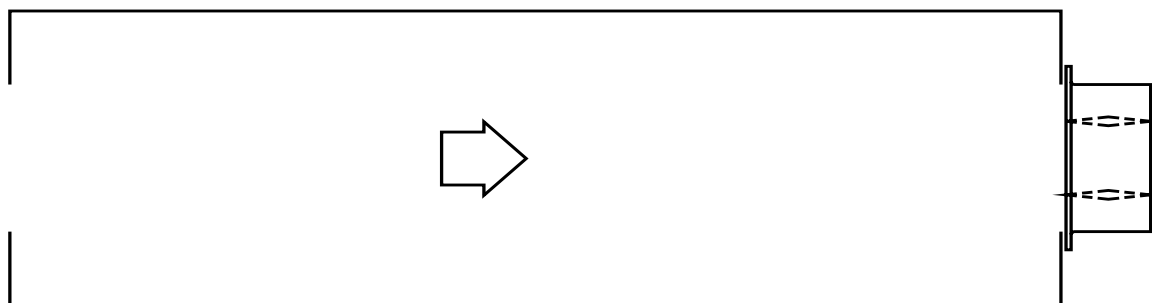
Figure 5.3 Illustrates a fully ducted damper. This configuration has the lowest pressure drop of the three test configurations because entrance and exit losses are minimized by straight duct runs upstream and downstream of the damper.

Figure 5.2 Illustrates a ducted damper exhausting air into an open area. This configuration has a lower pressure drop than Figure 5.5 because entrance losses are minimized by a straight duct run upstream of the damper.

Figure 5.5 Illustrates a plenum mounted damper. This configuration has the highest pressure drop because of extremely high entrance and exit losses due to the sudden changes of area in the system.



$$D = \sqrt{\frac{4(W)(H)}{3.14}}$$



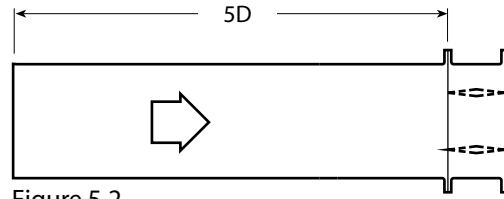
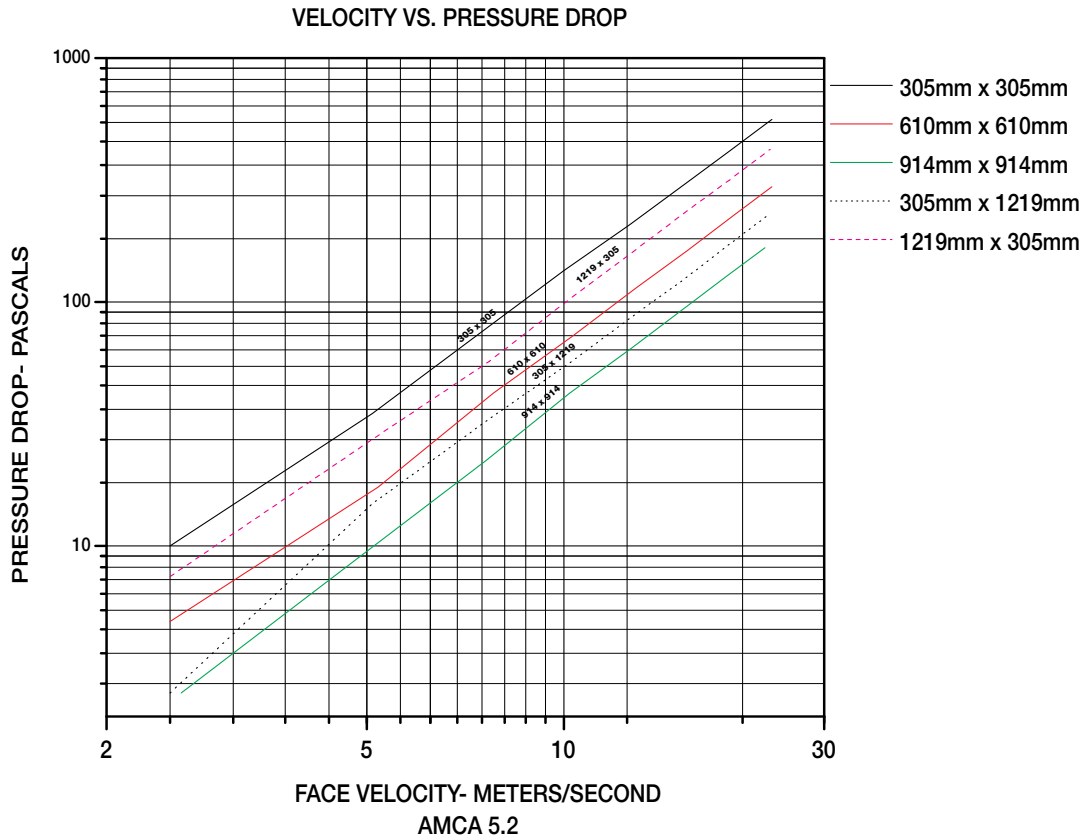


Figure 5.2



305mm x 305mm	
Velocity (m/s)	Pressure Drop (Pa)
2.5	10
5.1	35
7.7	80
10	135
12.6	207
15.5	311
17.8	411
20.8	561

610mm x 610mm	
Velocity (m/s)	Pressure Drop (Pa)
2.5	5
5.2	17
7.8	42
10.3	72
12.9	115
15.4	162
18.1	224
20.8	296

914mm x 914mm	
Velocity (m/s)	Pressure Drop (Pa)
2.6	3
5.1	10
7.6	22
10.2	42
12.7	65
15.3	95
17.7	127
20.3	167

305mm x 1219mm	
Velocity (m/s)	Pressure Drop (Pa)
2.5	3
5.1	15
7.6	32
10.3	57
12.9	90
15.3	125
18	174
20.5	227

1219mm x 305mm	
Velocity (m/s)	Pressure Drop (Pa)
2.5	8
5.1	27
7.7	57
10.3	105
12.9	164
15.6	242
17.9	316
20.7	424



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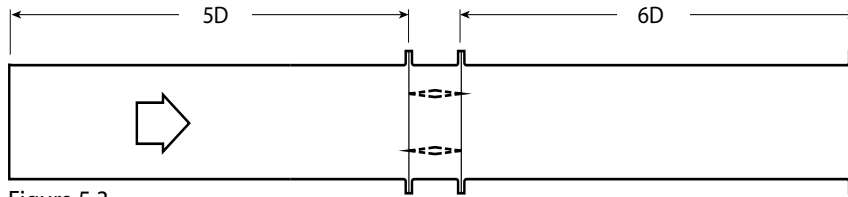
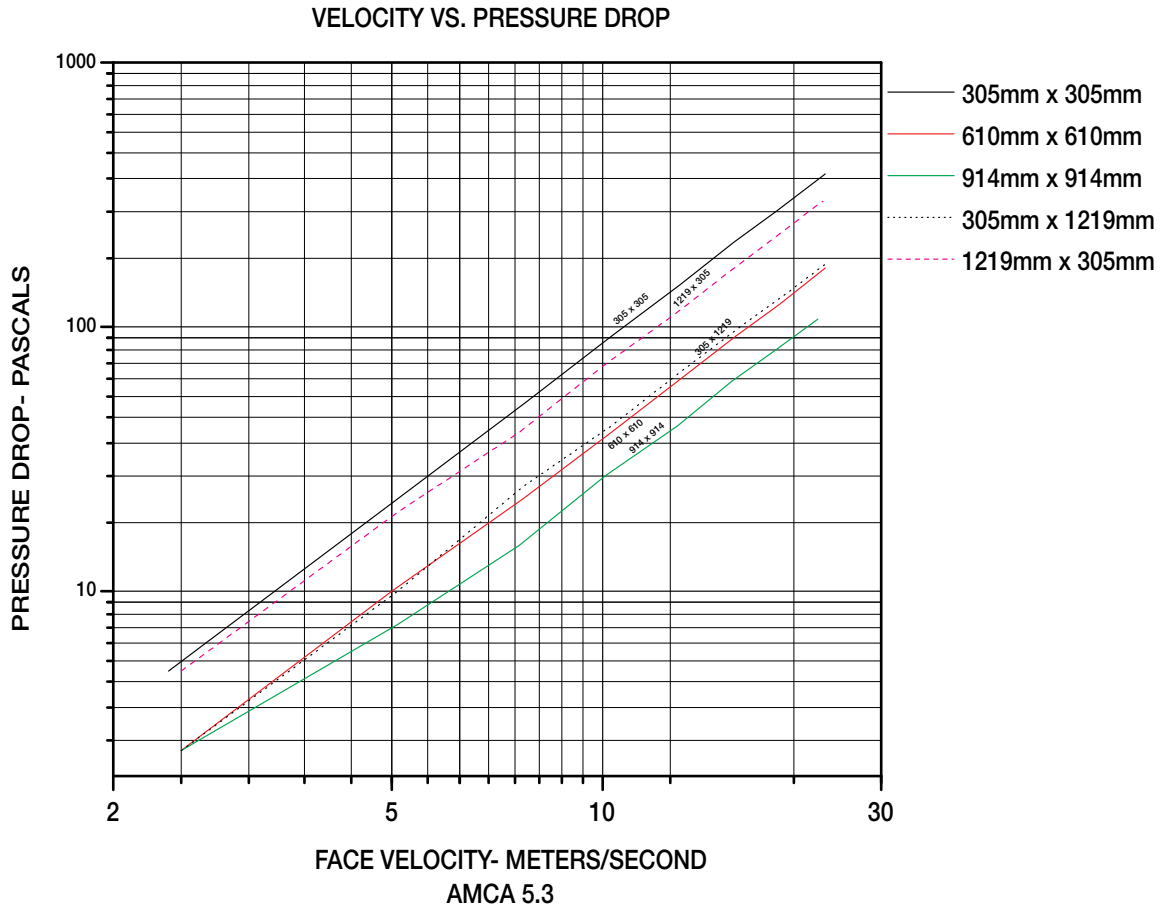


Figure 5.3



305mm x 305mm	
Velocity (m/s)	Pressure Drop (Pa)
2.4	5
5.1	22
7.8	52
10.3	92
12.9	145
15.4	209
17.7	274
20.8	379

610mm x 610mm	
Velocity (m/s)	Pressure Drop (Pa)
2.5	3
5	10
7.7	22
10.3	40
12.8	62
15.5	92
17.9	122
20.8	167

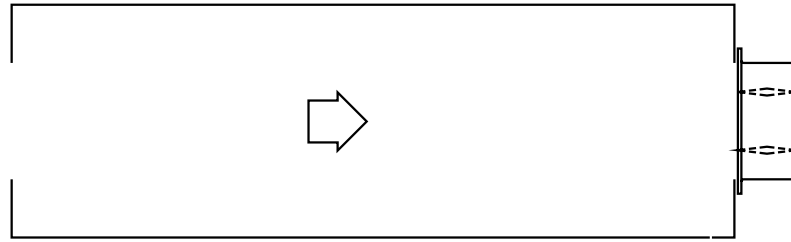
914mm x 914mm	
Velocity (m/s)	Pressure Drop (Pa)
2.5	3
5.1	8
7.6	15
10.1	27
12.8	42
15.3	62
17.7	82
20.3	107

305mm x 1219mm	
Velocity (m/s)	Pressure Drop (Pa)
2.5	3
5.1	10
7.7	25
10.3	42
12.9	67
15.7	100
18.7	140
20.9	174

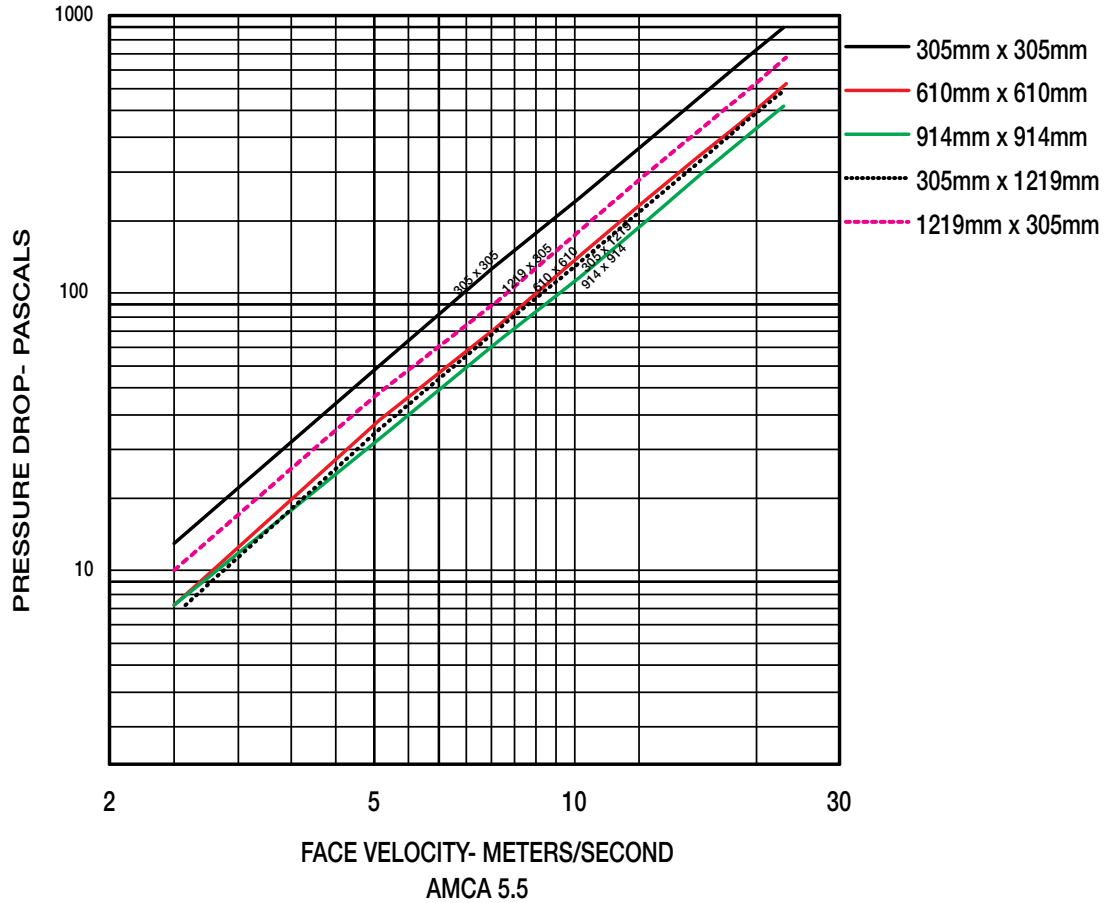
1219mm x 305mm	
Velocity (m/s)	Pressure Drop (Pa)
2.5	5
5.1	20
7.6	40
10.1	72
12.7	112
15.3	164
18	227
20.6	299



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VELOCITY VS. PRESSURE DROP



305mm x 305mm	
Velocity (m/s)	Pressure Drop (Pa)
2.5	13
5	55
7.5	122
10.2	222
12.7	349
15.4	508
17.9	688
20.6	907

610mm x 610mm	
Velocity (m/s)	Pressure Drop (Pa)
2.5	8
5	35
7.6	75
10.3	140
12.8	217
15.3	309
17.7	409
20.8	568

914mm x 914mm	
Velocity (m/s)	Pressure Drop (Pa)
2.5	8
5.1	30
7.7	67
10.2	115
12.9	184
15.5	269
18.1	354
20.6	471

305mm x 1219mm	
Velocity (m/s)	Pressure Drop (Pa)
2.6	8
5.1	32
7.7	75
10.2	130
12.7	202
15.5	301
18.1	416
20.6	536

1219mm x 305mm	
Velocity (m/s)	Pressure Drop (Pa)
2.5	1
5	42
7.7	95
10.3	172
12.7	264
15.3	381
17.9	521
20.8	707

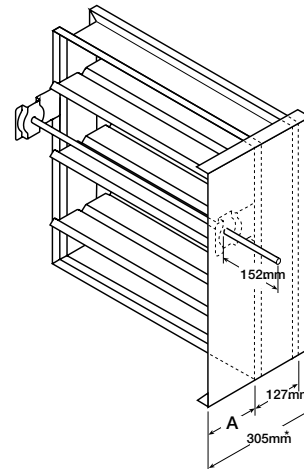
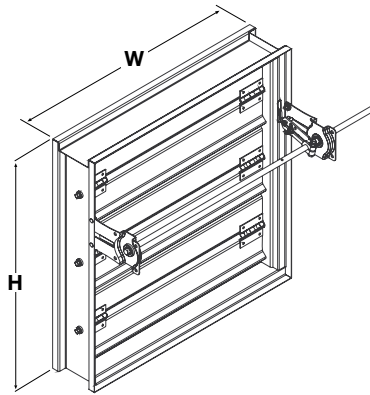


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Damper Sizing Information

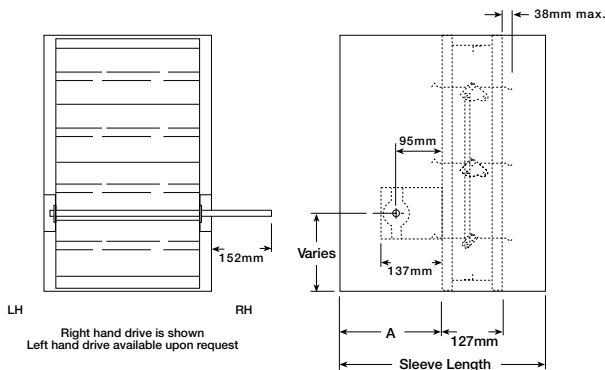
The following figures show maximum damper section size.

Single Section



Damper Sleeve Dimensional Data

The drawings below and corresponding table show the position of the FSD-M211 damper when mounted in a factory sleeve. The standard mounting locations provide enough space for the mounting of actuators, controls and allow space for installation of retaining angles and duct connections.



The "A" dimension is the location of the damper mounted in a factory sleeve. The table below shows the Standard, Minimum, and Maximum "A" dimensions.

in. (mm)	"A" Dimension	
	Standard	Maximum
All Dampers*	7 3/16 (183)	12 (305)
When H is 11 in. (279mm) or less with OCI, RRL, or TOR	12 (305)	12 (305)

*With the exception of dampers 10 in. high (254mm) or less.
NOTE: Entire damper frame is not required to be installed within the wall. The damper blades, when closed should be contained within the wall.

Specifications

Combination Fire Smoke Dampers meeting the following specifications shall be furnished and installed where shown on plans and/or as described in schedules. Dampers shall meet the requirements of the latest edition of NFPA 80, 90A, 92A, 92B, 101, and 105.

Dampers shall be tested, rated and labeled in accordance with the latest edition of UL Standards 555 and 555S. Dampers shall have a UL 555 fire rating of 1 1/2 hours. Each damper shall be equipped with a heat responsive device which has been tested and approved for use with the damper assembly in accordance with UL 555. The heat responsive device shall have a temperature rating of (specifier select one of the following) 74°C, 100°C, or 177°C. Dampers shall be UL labeled for use in dynamic systems. The damper shall have a dynamic closure airflow rating equal to or greater than the airflow at the damper's installed location and a dynamic closure pressure rating of 1 kPa.

Dampers shall have a UL 555S Leakage rating of Class I and a Temperature rating of 177°C. Dampers shall have a UL 555S operational airflow rating equal to or greater than the airflow at its installed location and an operational pressure rating of 996 Pa. Damper actuators shall be factory mounted and qualified for use with the damper in accordance with UL 555S. Damper actuators shall be (specifier select one of the following) electric type for 120 (24 or 230) volt operation or pneumatic type for 25 psi minimum (30 psi maximum) operation. Manufacturers submittal data shall indicate actuator space requirements around the damper.

All UL 555 and 555S Dynamic Closure Ratings, Operational Ratings and Leakage Ratings shall be qualified for airflow and pressure in either direction through the damper. UL ratings shall allow for mounting damper vertically (with blades running horizontal) or horizontally.

The Damper Manufacturers submittal data shall certify all air performance pressure drop data is licensed in accordance with the AMCA Certified Ratings Program for Test Figures 5.2, 5.3 and 5.5. Damper air performance data shall be developed in accordance with the latest edition of AMCA Standard 500-D. Dampers shall be labeled with the AMCA Air Performance Seal.

Damper blades shall be 1.5mm galvanized steel 3V type with three longitudinal grooves for reinforcement. Blades shall be completely symmetrical relative to their axle pivot point, presenting identical resistance to airflow and operation in either direction through the damper (blades that are non-symmetrical relative to their axle pivot point or utilize blade stops larger than 13mm are unacceptable).

Damper frames shall be galvanized steel formed into a structural hat channel shape with reinforced corners. Bearings shall be sintered bronze sleeve type rotating in extruded holes in the damper frame. Jamb seals shall be stainless steel compression type.

Basis of design is Greenheck Model FSD-M211.

